

CLAIMS

WHAT IS CLAIMED IS:

1. A packet buffer having a configuration that reception packets are written to a data buffer and a scheduler adjusts a read order of the packets written to the data buffer according to a service class recognized by a classifying unit, and wherein

said data buffer comprises:

M memory banks capable of being accessed simultaneously; and

a data access unit for accessing said memory banks in each memory cycle having a predetermined length, according to a predetermined number N or less of read commands and write commands;

a write requesting unit for dividing each reception packet into at least one data block according to a predetermined data length, and for issuing write requests for the respective data blocks;

a write-bank selecting unit for selecting different memory banks in response to N+1 consecutive write requests, respectively;

a data writing unit for selecting, in each memory cycle, maximum N write requests from said write requests issued by said write requesting unit, the selecting being performed in issuance order, and for inputting, to said data access unit, a write command to the effect that each of data blocks corresponding to the selected write requests is to be written to said memory banks selected by said write-bank selecting unit;

an address managing unit for managing information about said memory banks, and addresses of their storage areas where respective data blocks of each packet have been written;

a primary read-bank selecting unit for receiving, in each memory cycle, read

requests for N or less data blocks from said scheduler, and for selecting one or more memory bank(s) capable of being read in the same memory cycle from memory banks in which the data blocks specified by the respective read requests are stored, based on said information stored in said address managing unit;

5 a secondary read-bank selecting unit for storing a read request which has not been achieved in each memory cycle, the read request being among read requests received in the same memory cycle from said scheduler, and for selecting a memory bank corresponding to the stored read request in the next memory cycle; and

10 a data reading unit for selecting a predetermined number L or less of read requests from said read requests for the memory banks selected by said primary and secondary read-bank selecting units, and for inputting, to said data access unit, L or less read commands to the effect that respective data blocks are to be read from the memory banks corresponding to said read requests.

15 2. The packet buffer according to claim 1, wherein said data access unit executes a read command and a write command in each memory cycle, the memory cycle having a same length as a period in which a packet having a data length is received, the data length being equivalent to a data length as a reference to packet division.

3. The packet buffer according to claim 2; wherein:

20 said data reading unit selects a number L or less of read requests, the number being an integer and the L not exceeding a value obtained by multiplying a constant 1.5 by said predetermined number N; and

said data buffer comprises M memory banks, the M being a value obtained by adding said predetermined number N and a constant 1 to said integer L.

25 4. The packet buffer according to claim 1, wherein said write-bank selecting unit

comprises:

a log storing unit for storing, as information representing a write request log, bank numbers of each memory bank designated as write banks in the past N write requests;

a bank gathering unit for gathering, as respective bank numbers of write bank candidates, bank numbers of memory banks to which a data block can be written in a current memory cycle, based on said information representing the write request log and all of respective bank numbers of memory banks from which a data block is read in the current memory cycle;

a rank setting unit for determining, according to a predetermined rule, a priority order of said write bank candidates gathered by said bank gathering unit; and

a preferred bank selecting unit for selecting N bank numbers from said bank numbers indicating said write bank candidates according to said priority order, and for inputting the selected N bank numbers to said data writing unit in order to specify write banks.

5. The packet buffer according to claim 4, wherein said rank setting unit comprises:

a cyclic counter cyclically counts a natural number from one to M for every write request, the number M being a number of memory banks provided in said data buffer;

a preferred candidate selecting unit for selecting, as bank numbers indicating preferred candidates, bank numbers not stored in said log storing unit and excluding a bank number of a current read bank, from said bank numbers of said write bank candidates gathered by said bank gathering unit; and

a rank determining unit for giving a highest priority to one of said preferred candidates based on a count of said cyclic counter.

6. The packet buffer according to claim 1, wherein each of said memory banks in said data buffer is formed of DRAMs, the packet buffer further comprising:

a bank detecting unit for detecting one or more memory bank(s) that is/are not subject(s) of access, based on a write command and a read command that are input to said data buffer; and

command issuing units provided corresponding to said M memory banks, each for determining a storage area to be read in a predetermined order, every time its corresponding memory bank is detected by said bank detecting unit, the storage area being in the detected memory bank, and for generating a pseudo-read command to the effect that data are to be read from the storage area and inputting the generated pseudo-read command to said data buffer.

7. The packet buffer according to claim 1, further comprising:

a secondary buffer for storing data read from said data buffer corresponding to read requests;

a timer for monitoring elapsed times from issuance of said respective read requests whose data are stored in said secondary buffer, the issuance being performed by said scheduler, and for outputting a termination notice indicating a completion of a waiting time for a read request concerned when a predetermined output waiting time elapses; and

an output controlling unit for outputting data stored in said secondary buffer corresponding to said read request concerned, in response to said termination notice.